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ROADMAP FOR GENERATIVE AI

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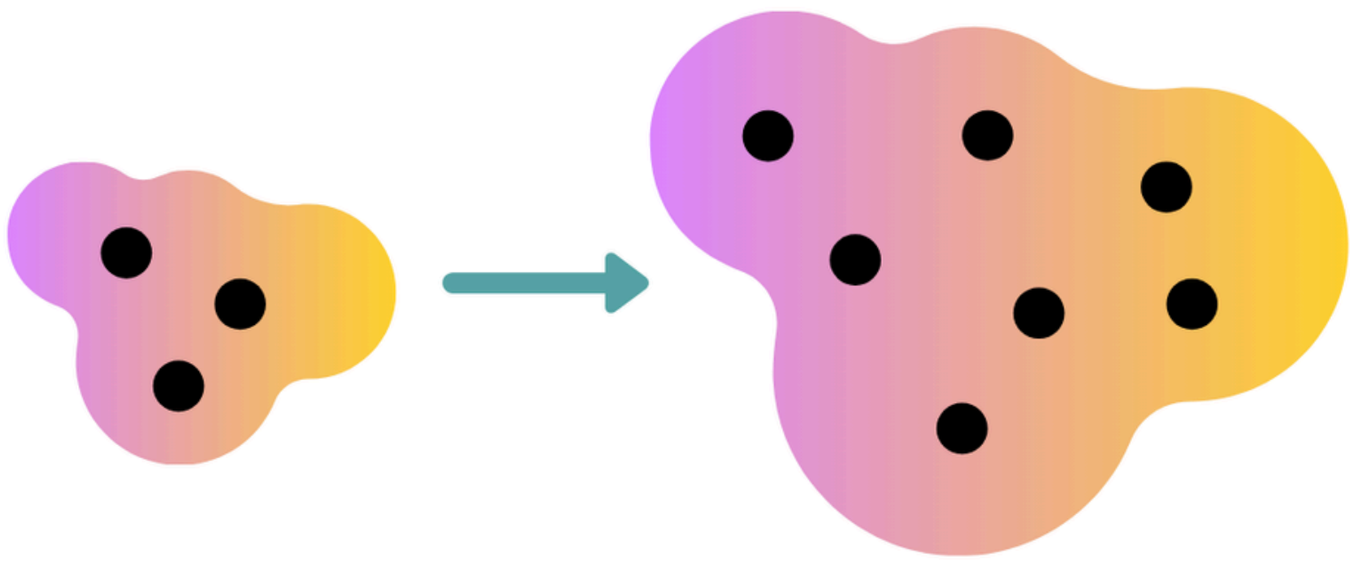
DAY 1

Introduction to Generative Models:

📒 Topics

1. Learn about the basics of generative models and their applications.



Generating new data using past data

DAY 2

Understanding GANs:

📒 Topics

1. Dive into Generative Adversarial Networks (GANs), their architecture, and training process.

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DAY 3

Variational Autoencoders (VAEs):

Topics

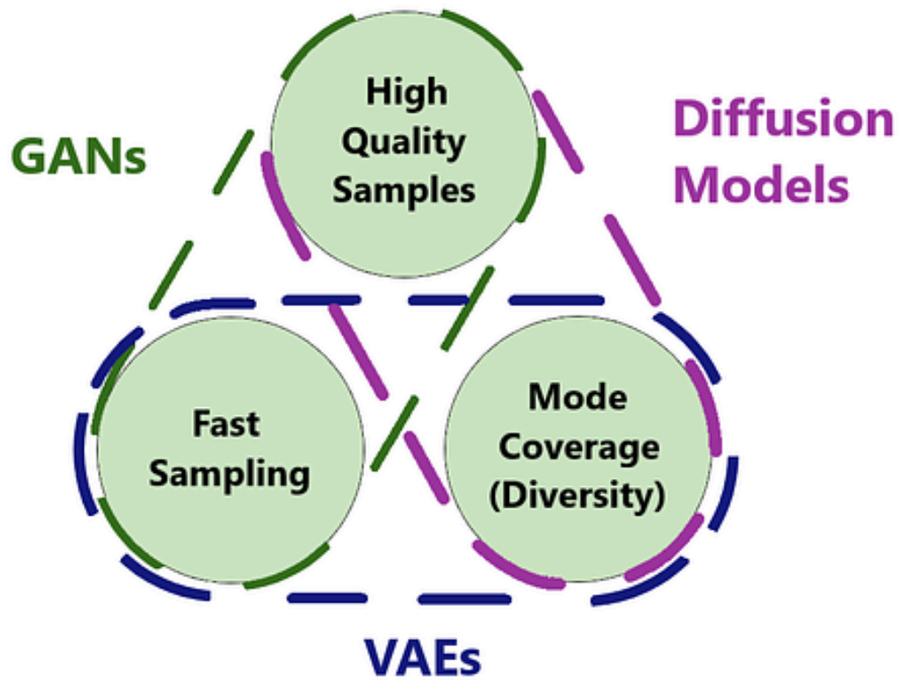
1. Explore Variational Autoencoders, their architecture, and how they generate data.

DAY 4

GANs vs. VAEs:

Topics

1. Understand the differences and similarities between GANs and VAEs.



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DAY 5

Implementing Basic Generative Models:

Topics

1. Implement a simple GAN and VAE using TensorFlow or PyTorch.

DAY 6

Conditional GANs:

Topics

1. Learn about conditional GANs and how they can be applied in various tasks.

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DAY 7

Deep Convolutional GANs (DCGANs):

Topics

1. Study the architecture and training techniques of DCGANs for generating high-quality images.

DAY 8

StyleGAN and StyleGAN2:

Topics

1. Explore the advancements made in GANs with StyleGAN and StyleGAN2 for realistic image synthesis.

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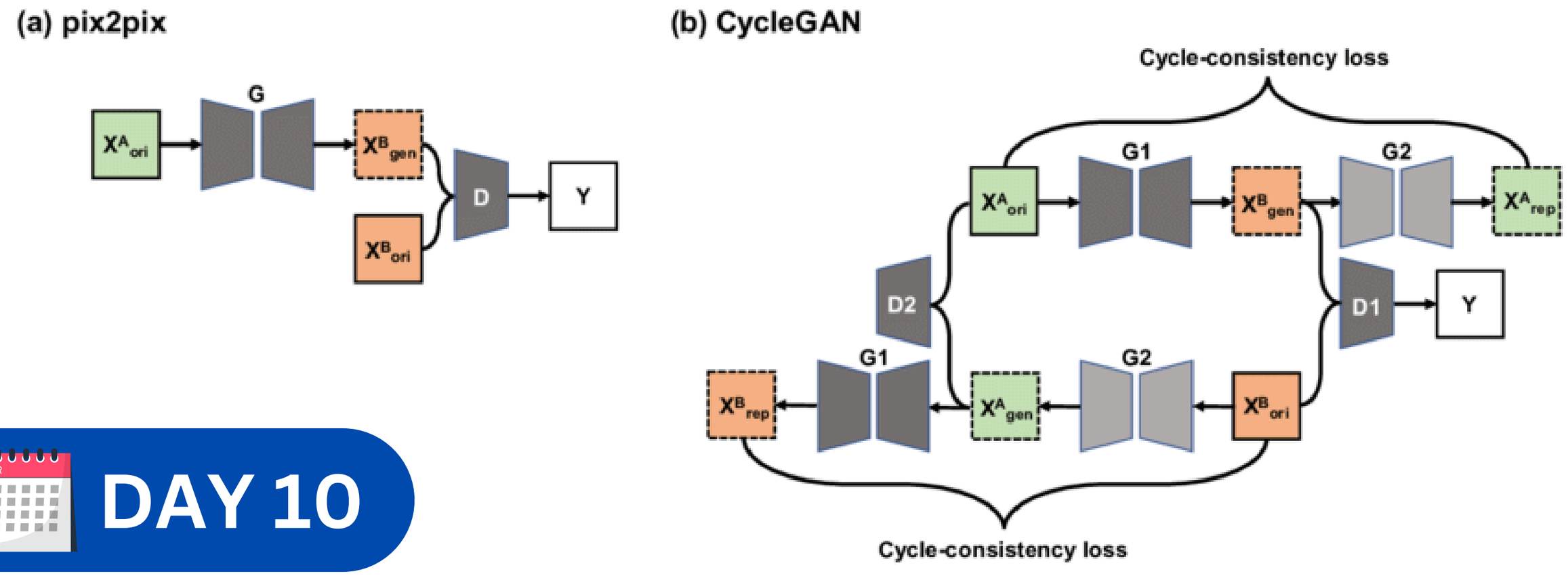
DAY 9

CycleGAN and Pix2Pix:

📓 Topics

1. Understand the concept of image-to-image translation using CycleGAN and Pix2Pix.



DAY 10

Text Generation with GANs:

📓 Topics

1. Learn about text generation techniques using GANs and recurrent neural networks.

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Notes

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DAY 11

Image Generation Applications:

Topics

1. Explore applications of generative models in image editing, synthesis, and restoration tasks.

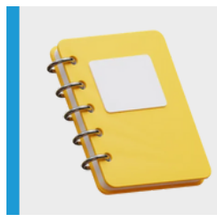
DAY 12

Generative Models for Video:

Topics

1. Study generative models' applications in video generation and prediction.

Music and Audio Generation:



Topics

1. Explore techniques for generating music and audio using generative models.

Ethical Considerations:

Topics

1. Discuss ethical implications and biases associated with generative models.

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DAY 15

Evaluation Metrics:

Topics

1. Learn about evaluation metrics for assessing the quality of generated samples.

DAY 16

Attention Mechanisms:

Topics

1. Study the role of attention mechanisms in improving the performance of generative models.

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DAY 17

Self-Attention Generative Models:

Topics

1. Explore Transformer-based architectures for generative tasks such as image and text generation.

DAY 18

Adversarial Defense Techniques:

Topics

1. Learn about adversarial attacks and defense mechanisms in the context of generative models.

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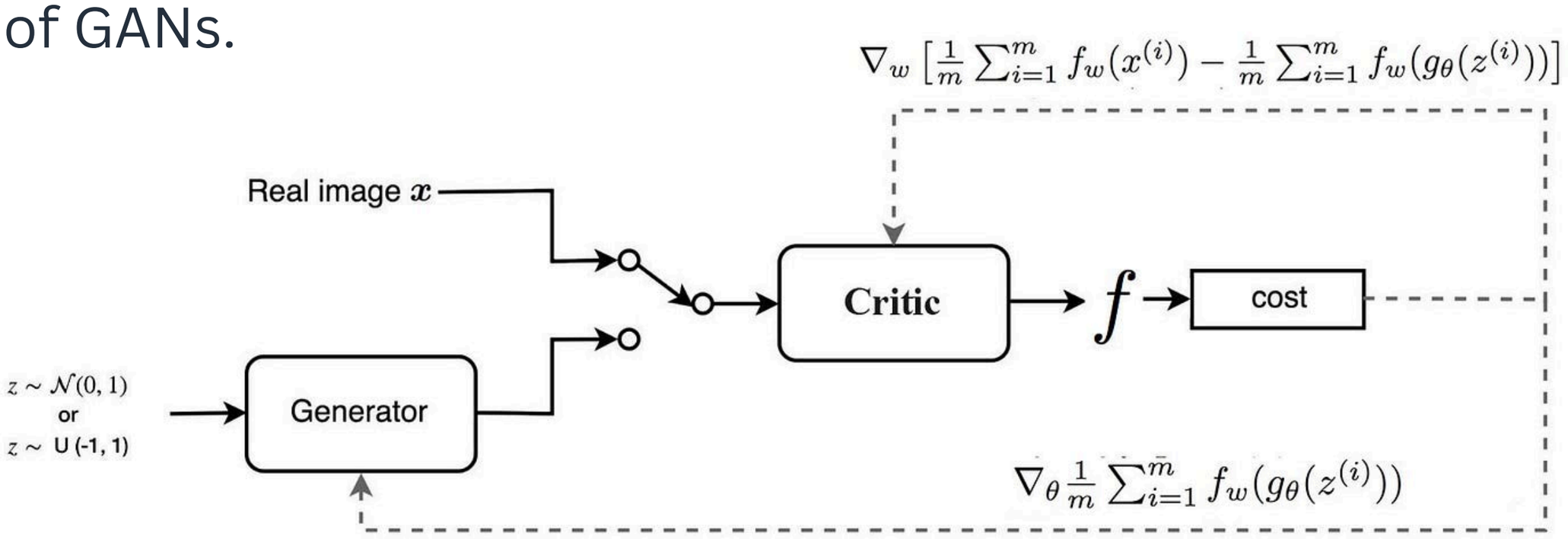
DAY 19

Wasserstein GAN (WGAN):

📒 Topics

1. Dive deeper into WGAN and its variants for stable training of GANs.



DAY 20

Energy-Based Models (EBMs):

📒 Topics

1. Explore energy-based models as an alternative approach to generative modeling.

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DAY 21

Image Generation Project:

Topics

1. Work on a project to generate images using GANs or VAEs on a dataset of your choice.

DAY 22

Text Generation Project:

Topics

1. Implement a text generation project using recurrent neural networks or transformer-based models.

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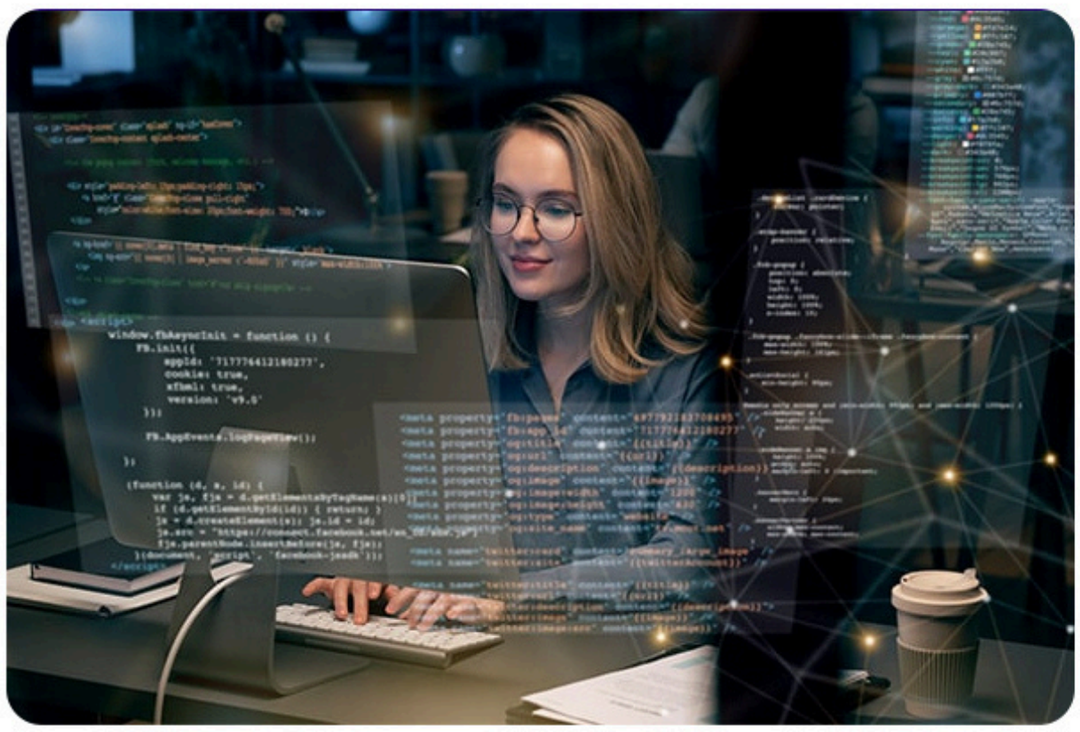

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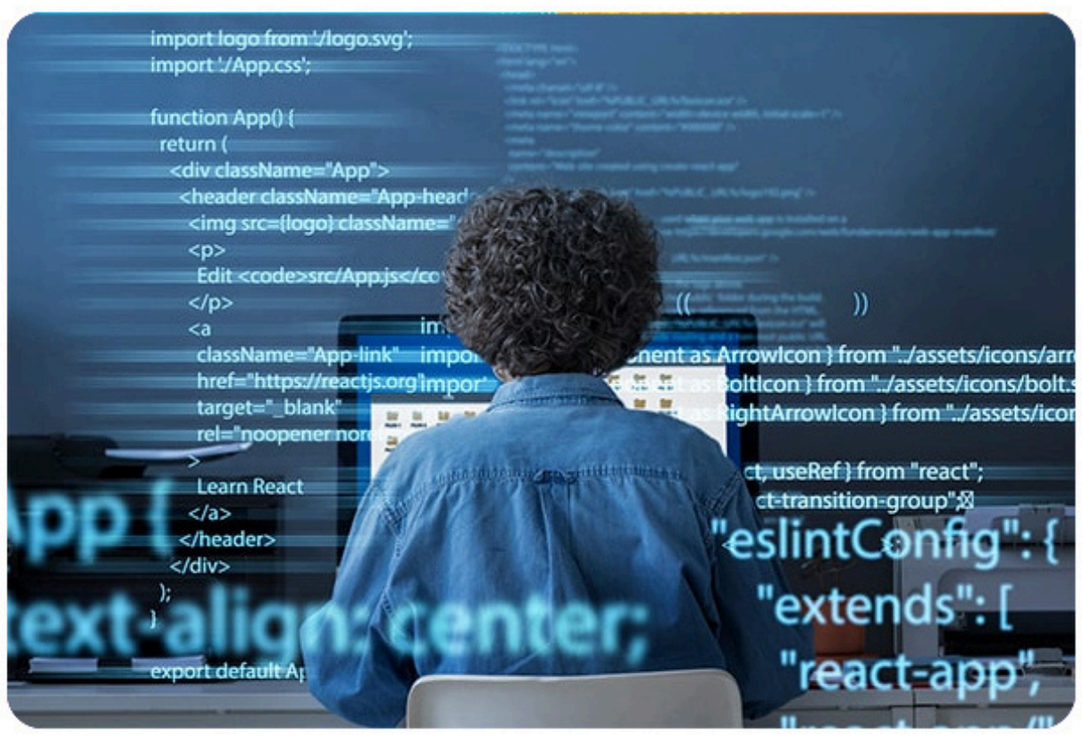

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DAY 23

Style Transfer Project:

Topics

1. Experiment with style transfer techniques using pre-trained GAN models.

DAY 24

Video Generation Project:

Topics

1. Explore video generation using spatio-temporal generative models like VideoGPT or Temporal GANs.

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DAY 25

Creative Exploration:

Topics

1. Engage in creative exploration by experimenting with different architectures and datasets to generate novel outputs.

DAY 26

GANs vs. VModel Optimization Techniques:AEs:

Topics

1. Learn about model optimization techniques to improve the efficiency and performance of generative models.

DAY 27

Hardware Acceleration:

📓 Topics

1. Explore hardware acceleration options such as GPUs and TPUs for training and deploying generative models.

DAY 28

Model Compression and Quantization:

📓 Topics

1. Study techniques for model compression and quantization to deploy generative models on resource-constrained devices.

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DAY 29

Deployment Considerations:

Topics

1. Discuss considerations for deploying generative models in real-world applications, including privacy and security concerns.

DAY 30

Final Project and Reflection:

Topics

1. Work on a final project that showcases your understanding of generative AI concepts and techniques. Reflect on your journey and areas for future exploration.

Practice Questions:

1. How can GANs be used for image inpainting?
2. What modifications are needed to adapt GANs for video generation compared to image generation?
3. How can VAEs be used for generating music sequences?
4. How can generative models perpetuate biases, and what measures can be taken to mitigate them?
5. What metrics can be used to evaluate the diversity and fidelity of generated images?
6. How does the incorporation of attention mechanisms enhance the performance of sequence-to-sequence generative models?
7. What strategies can be employed to defend against adversarial attacks in GANs?
8. Explain the concept of Wasserstein distance and its significance in training GANs.
9. How do energy-based models differ from likelihood-based models in generative modeling?

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